

REMARKS/ARGUMENTS

Claims 1-12 are active.

Claims 7-12 are supported by Claims 2-5.

Claim 1 is supported in the paragraph bridging pages 6 and 7 of the specification.

As described in the Background of the specification at page 1, the methanolysis reaction of triacylglycerol with methanol can be divided into three phases. In the first phase, a fatty acid methyl ester molecule and a diacylglycerol molecule are generated from a triacylglycerol molecule and a methanol molecule. In the second phase, a fatty acid methyl ester molecule and a monoacylglycerol molecule are generated from a diacylglycerol molecule and a methanol molecule. In the third phase, a fatty acid methyl ester molecule and a glycerin molecule are generated from a monoacylglycerol molecule and a methanol molecule.

In conventional processes for producing biodiesel fuel, the methanolysis reaction is completed following the third phase. Thus, glycerin is generated as a by-product.

In the present invention, however, biodiesel fuel can be produced without generating glycerin (see page 4, lines 10-18 of the specification).

The biodiesel fuel produced by the process according to the present invention is mainly composed of fatty acid methyl esters, diacylglycerol, and monoacylglycerol (Cf. Claim 6). In contrast, biodiesel fuels produced by the conventional technique are mainly composed of fatty acid methyl esters and do not substantially contain diacylglycerol or monoacylglycerol (please see page 4, line 24 to page 5, line 2 of the specification).

The process of the present invention is such that in the methanolysis reaction a catalyst is not used and under reaction conditions where glycerin is not generated. Claim 1 as amended requires that the reaction conditions where glycerin is not generated include a reaction temperature of from 370°C to 500°C and a reaction pressure of from 20 MPa to 60

MPa. The biodiesel fuel produced under such reaction conditions does not contain glycerin (see definition at page 6 of the present specification). Even if glycerin is generated in small amounts, the generated glycerin does not have to be separated from the biodiesel fuel (please see the paragraph bridging pages 6 and 7).

For illustration, a bio-diesel fuel produced in Example 1 under the reaction conditions within what is defined in the claims was found to consist of approximately 50% various fatty acid methyl esters by weight, approximately 25% monoacylglycerol by weight, approximately 20% diacylglycerol by weight, approximately 5% other aliphatic compounds by weight, and less than 1% each triacylglycerol and glycerin by weight. In the present invention, a step of separating glycerin from methyl esters of fatty acids is not necessary, as it is substantially not generated. Examples 2 and 3 present similar results.

Furthermore, removing diacylglycerols and monoacylglycerol is also not necessary in the present invention. Under the temperature/pressure ranges recited in claim 1 of the present invention as amended, degradation of a carbon chain in a fatty acid group proceeds in parallel with the methanolysis reaction (please see page 7, lines 5 to 25). This degradation of a carbon chain lowers the viscosity of a mixture mainly composed of fatty acid methyl esters, diacylglycerol, and monoacylglycerol to such a level that it is suitable as a diesel fuel.

Claims 1-6 have been rejected under 35 USC 103(a) citing to Tsuto which as listed on the PTO-892 form is U.S. 6,288,251 no thte US 2001/0053860 noted on page 2 of the rejection. Based on the citations and discussion of the rejection, Applicants understand that the rejection is to the Tsuto patent (U.S. '251) and not the '860 PG PUB to Peter et al.

While Applicants understand that, during the prosecution of an application in the Office, claims are to be given their broadest reasonable interpretation consistent with the

teaching in the specification (*In re Bond*, 710 F.2d 831, 833 (Fed. Cir. 1990)), it is error to disregard express limitations in the claims.

The plain language of the claims before and after the presently submitted amendment requires that glycerin is not generated under the reaction conditions set forth in the claims. (cf Claim 1). Such is not taught or suggested in US 6,288,251.

The Specification consistently defines the “glycerin is not generated” component in the reaction of Applicants’ claimed process at page 6. Applicants submit that the Examiner erred in broadly interpreting the scope and content of the subject matter claimed in a manner inconsistent with the plain language of the claims and the teaching of the Specification. Col. 4, lines 6-25 of Tsuto discloses that the reaction temperature is within a range of 250-300 °C and the pressure is within a range of 3-15 MPa. The reference does not refer to the temperature/pressure ranges recited in claim 1 as amended of the present invention.

It is not sufficient for the Examiner to base a rejection for obviousness, as the Examiner has done (OA, pp. 4), on the classic patent law axiom that it is within the ordinary skill of the artisan to optimize result effective variables. Persons having ordinary skill in the art would not have acted to optimize the choice or the effect of certain method steps as Applicants’ claims require which the prior art does not disclose and would not have suggested for use in the prior art processes upon which the Examiner relies to make a case for obviousness. Persons having ordinary skill in the art would not have acted to eliminate process problems that the applied prior art does not recognize.

Persons having ordinary skill in the art normally seek “to improve upon what is already generally known.” *In re Peterson*, 315 F.3d 1325, 1330 (Fed. Cir. 2003). However, before persons having ordinary skill in the art would want to optimize the choice or use of specific methods in a claimed chemical process, the prior art must at least generally recognize the process and generally suggest the components the claimed process utilizes to achieve its

goals. To establish that Applicants' claimed process would have been obvious to a person having ordinary skill in the art, the prior art must reasonably suggest that persons having ordinary skill in the art do what Applicants claims require. Here, the only suggestion to do what Applicants have done is Applicants' own disclosure, i.e. hindsight.

The differences in terms of temperatures and pressures cause remarkable differences in whether or not glycerin is produced in the biodiesel fuels finally obtained as discussed above prefacing the rejection at hand.

Column 4, line 66 to column 5, line 2 of Tstuo reads: "The liquid reaction product obtained by the above-mentioned reaction contains glycerin and a lower alcohol in addition to a fatty acid ester, i.e., a final product of the present process." The paragraph of column 5, lines 11-19 and Examples 1 and 3 of the reference literally describe a separation process to separate an oil layer (a fatty acid ester) and a glycerin layer (glycerin). These descriptions clearly suggest that glycerin is inevitably generated as a by-product, and the biodiesel fuel obtained after separation of glycerin is mainly composed of fatty acid esters and contains neither diacylglycerols nor monoacylglycerol.

Those skilled in the art would not predict that the temperature/pressure ranges recited in claim 1 as amended of the present invention can prevent the generation of glycerol as a byproduct.

The process and the biodiesel fuel claimed in the present application cannot be considered obvious in light of what is taught by Tstuo. Accordingly, withdrawal of the rejection is requested.

A Notice of Allowance is also requested.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.
Norman F. Oblon



Daniel J. Pereira, Ph.D.
Attorney of Record
Registration No. 45,518

Customer Number

22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 08/07)